HISTORIC PINE FOREST OF RAVENNA.

VOL. VI. APRIL, 1900. No. 4.

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YALE FOREST SCHOOL.

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THE WAY TO ESTIMATE CORDWOOD.

BIG TREES OF CALIFORNIA.

TABLE OF CONTENTS.

AVENUE DI BYRON, RAVENNA, ITALY.....Frontispiece.

PINE FOREST OF RAVENNA..... 73
(By the Founder of THE FORESTER.)

THE WAY TO ESTIMATE CORDWOOD..... 76
A Suggestion Regarding Timber Estimating, with Computation Tables.

THE BIG TREES OF CALIFORNIA..... 79
Groves which Congress is trying to Protect from Destruction.

YALE FOREST SCHOOL..... 83
Foundation of a New Department at Yale University.

GRAZING IN THE WESTERN FOREST RESERVES..... 85
An Official Investigation by the Division of Forestry.

CANADIAN FORESTRY ASSOCIATION..... 86

APPROVAL OF MINNESOTA PARK PROJECT..... 86

PENNSYLVANIA'S INTEREST IN FORESTRY..... 87

STUDYING AMERICAN FORESTS..... 88
Field Investigations. A Study of Hemlock.
Timber Measurements. Tree Planting Plans.
Forest Valuation. Forest Exhibit at Paris.

ALONG THE SMOKY RANGE..... 90

RECENT LEGISLATION..... 90
New York. Indiana.
Michigan.

EDITORIAL..... 93
The Yale Forest School.
Progress of Forestry.
An Increasing Membership.
Current Comment. Save the Forests.
Reforestration in Hawaii. From Different Standpoints.
College Men and Forestry. Ingenuity in Woodwork.
Utilizing Forest Reserves. Forest Destruction.
Restraining Sheep Grazing. Experience as a Teacher.
For State Instruction. Checking Forest Denudation.
Unanimous Public Opinion. A Lumber Advocate.

RECENT PUBLICATIONS..... 96

THE FOREST OF RAVENNA.

"Avenue di Byron"—Stately trees which stood near the entrance to the forest—showing historic specimens of the Stone-Pine.

THE FORESTER.

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The Pine Forest of Ravenna.

Passing of the Historic Forest in the Delta of the River Po, Italy.

BY THE FOUNDER OF THE FORESTER.

La Pineta or the Pine Forest of Ravenna is perhaps the most famous forest of all the world. This is due more to its historic associations than to its beauty. It was mentioned fourteen centuries ago in the time of Odoacer and Theodoric. It was extolled by Dante, Boccaccio, Dryden and Byron. In Don Juan, Canto III., Stanza CV., Lord Byron speaks of it as follows:

"Sweet hour of twilight! in the solitude
Of the pine forest, and the silent shore
Which bounds Ravenna's immortal wood,
Rooted where once the Adrian wave flow'd o'er,
To where the last Cæsarean fortress stood,
Evergreen forest! which Boccaccio's lore
And Dryden's lay made haunted ground to me
How have I loved the twilight hour and thee!"

Ravenna was once, it is said, located on the sea. Now it is several miles inland. The forest is located on a spit of sandy land along the Adriatic. The soil on which this forest is located was, no doubt, once an island or beach similar to the Lido in front of Venice. Ravenna is in the Delta of the Po, and the sediment filled the lagoon between the sandspit and the mainland. Now the city is connected with the sea by means of canals which drain the rice-fields between the city and the forest.

The forest as shown in the illustration by the bridge will never be seen again in such form. The severe winter of 1880–81 and conflagrations have destroyed most of it. The forest consists of *Pinus pinea* (literally "Pine of Pines"). This tree is a native of the Mediterranean region and cannot endure much cold, although in sunny Italy it is often freezing, and in April of last year in Venice the black gondolas were white with snow.

This suggests an interesting question. Pines are usually regarded as trees of the temperate zone, but there is a species which cannot endure a slight freeze. The same is true, to a certain extent, of *Pinus maritima* and *Pinus heterophylla*. The latter grows only along our Gulf Coast, in Cuba and Honduras. The Island of New Providence, on which Nassau, the capital of the Bahamas, is located is covered with *Pinus Bahamensis*. In this region frost never occurs. Perhaps many species of Pines will grow well in tropical regions, but owing to the richness of the soil are soon crowded out by the luxuriant growth of broad-leaved species.

Just north of Ravenna is the great delta of the Po, in the center of which is the famous "Lago di Comacchio," a lagoon 30,000 hectares in extent where pisciculture has been successfully practised for many centuries.

Ravenna is easily reached by rail from Ferrara—the latter city is now but a shadow of its former self. When I visited there, men and women were busy pulling out the grass which persisted in

growing between the cobble-stones of its streets. En route to Ravenna the train passed through a region of heavy alluvial soil. Peasants were ploughing in the fields with teams of four and six large, white oxen. At certain times this region is infested with fever.

The town of Ravenna is attractive to those persons who are interested in old cathedrals and church relics, but to others is dull. We hunted in vain for an attractive hotel and were haunted by the valuable caution of Baedeker that the hotel-keepers of Ravenna bear considerable watching.

After a great deal of bargaining we were able to secure a wagon drawn by two ponies which were not overfed and were fit only for a very short journey. The road was good and on both sides were rice fields. The natives were working knee-deep in the mud. This is a region of great fertility, but of course, at times visited by fever. After a short drive we crossed the bridge shown in the frontis-piece. The driver pointed out in the distance to the south of us, on the top of a hill, San Marino, the smallest republic in the world.

At the entrance to the forest there were many donkeys and women loaded with wood. They were waiting their turns to have their burdens weighed. This wood consisted mostly of small limbs and twigs, split stumps and roots.

Upon entering the forest a short distance we struck a sandy road over which a pair of good horses could have sped at a ten-mile gait but our team was stalled, so we alighted and walked.

The Stone-pine (*Pinus pinea*) is a tall, picturesque tree with a large parasol-like head. It was planted in very early times in gardens and is always given a very prominent place by artists in classic pictures. It is associated with porticoes, pillars, fragments of old temples and other historic objects of the Italian landscape.

The trees are often far apart in this forest and there are many bare places. Many ponies were browsing on the herbage. Few forests of the world have had as many ups and downs. It is now owned by the city of Ravenna and shows the effects of the many vicissitudes through which it has passed. The oldest Pines are probably about two hundred years of age. Although of great value in Italy, the wood of this Pine is only of a medium quality. In 1836 Pope Gregory sold this forest "in a way" to the brotherhood of St. Peter in Rome for 186,170 francs and a yearly donation of three pounds of wax and thirty-two loads of wood, reserving the privilege of using eighteen trees per annum for building purposes. This was really however only a sale of privileges which allowed the collection of Pine cones, the utilization of dying trees, windfalls and the fisheries. It was forbidden to cut a sound tree and it was further specified that the wood should be improved owing to its importance as a windbreak against the Sirocco and Bora, and as a safeguard against the fevers of the flats near Comacchio. The Bora is a blustering dry wind from the Julian Alps blowing across the Adriatic Sea. The brotherhood of St. Peter farmed out the woods for 9576 francs, eight loads of wood and thirty-five kilograms of hulled Pine seed per annum. In addition to this the natives of Ravenna had the continuous right to gather small twigs, etc., and to use the woodland for pasturage.

The seeds of the Stone-pine are edible and have the flavor of almonds. The cones are the largest of native European conifers and have always been much prized for fuel. The collection of the seeds is an important industry. Women and children pick the cones from the ground while the men, called "pinajuoli," armed with a hatchet fastened to a long willow pole climb the trees. The hatchet is hooked over a lower limb and then, with hands on the pole and feet on the trunk, they clamber hand over hand into the tree. After cutting the cones from the tree they descend in the same fashion.

The cones are piled in heaps near the dwellings of the wood-guards, where they remain until spring time. Then they are spread on a stone threshing-floor and turned often until the heat of the sun opens the cones and the seeds drop out.

The few attempts which have been instituted for the improvement and protection of this forest have been offset by the peasant rights to pasturage. This forest is but a shadow of its former self, and the time is not far distant when it will be a thing of the past unless there is soon a change in the form of management.

JOHN GIFFORD,
Ithaca, N. Y.

A CANAL THROUGH THE FOREST.

Waterway draining ricefields and forest, and connecting Ravenna with the Adriatic Sea.

The Way to Estimate Cordwood: A Suggestion.

Timber estimating has always been an important question both to the lumberman and to the scientific forester. Comparing our own methods in this branch of forest work with those of Europe we find that, while the former are unusually quick and practical, the latter are apt to be much more accurate. We ought to be able to profit from both sources; to combine what is best in each, or modify it to suit our needs and conditions.

It is my purpose here to explain a system of measurement known in Europe as the method by the "absolute factor of shape." Though little used, except in Denmark, it appears to be well suited to many of our hardwood forests for determining their cubic contents or cordwood; and, with the help of the existing log-rules, to the more uniform softwood forests for determining their contents in board feet.

One or more sample plots within the forest, representing as nearly as possible the average conditions, are selected and the area of each determined. They may constitute together from one-half per cent. to five per cent. of the total area, according to the uniformity of the forest and the degree of accuracy required. On these sample areas the data are first obtained for calculating their own volume in wood, and from the latter the total volume of the forest or woodland may be readily ascertained by the proportion of the respective areas.

The preliminary measurements on the sample area or areas are the following:

1. The diameters at breast height of all the trees on the selected area, except the very smallest—let us say those below three inches.

2. The heights of a sufficient number of average representative trees of each species to determine the general height-growth conditions of the forest. These trees may be selected while taking the diameters and should include small, intermediate, and large trees of each kind, if present. The respective diameters should be noted in connection with the heights. By pointing off the heights on cross-section paper in conjunction with the corresponding diameters and drawing a graduated curve through these points, the relation existing between heights and diameters for every size of tree may be quickly found.

3. The volume of the stem above breast-height in several average representative trees for each species. The method by sections is the best, as it is accurate and easy, and generally familiar. The full height of the tree and its diameter at breast-height should be noted in connection with the stem volume in each case.

In deciding what constitutes the stem of the tree, something must be left to the judgment of the estimator. In conifers the solution of this question is generally easy. In them the upper portions of the tops may sometimes have to be discarded; while, on the other hand, the stems of hardwoods usually do not extend far into the crowns of the trees. The measurements should not extend beyond the needs of the case and should conform to the actual available use of the wood.

These trees, of course, will have to be felled; but since an estimate of the timber is usually followed by a cutting or is contemporaneous with it, this circumstance should not be objectionable, especially as the trees may often be selected so as to improve the silvicultural conditions of the forest.

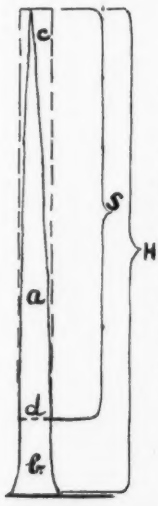
The measurements under 3 are taken in order to determine the "absolute factor of shape" for each species. This "factor" is simply the proportion between the volume of the stem obtained as already explained and the volume of an imaginary cylinder having the same basal area as the stem and extending in length from the same level at breast-height vertically to the tip of the tree. Thus, in a tree whose basal area at the level of breast height is 1.2 square feet, whose height from that same level to the tip of the tree is 65 feet, and whose stem volume between, as ascer-

tained by measurement, is 35.1 cubic feet, the "absolute factor of shape" would be: $\frac{35.1}{78}$, or .45.

Where the forest growth is somewhat uniform the factors of shape of the trees felled for each species may be averaged separately for that species to obtain its factor of shape. Where there is a wider range in the sizes of the trees, however, the factors of shape for these may be found by interpolation on cross-section paper as in the case of the height-curves.

4. Whenever the branches of trees are of value their volume should be ascertained. The trees taken for the stem volume measurements can be utilized as sample trees for this purpose, their branches being stacked in cords, separately for each species, and the results reduced to solid cubic contents, .7 being the reducing factor.

The following example will show how the measurements may be tabulated and the volume computed:—



d = diameter of tree at breast-height. a = stem above breast-height. c = the corresponding cylinder. b = stem below breast-height. s = portion of the stem included in the "factor of shape." $\frac{a}{c}$ = "absolute factor of shape." H = total height of tree.

Computation for Beech.—a, for the stem portion above breast-height. (See *a* in the diagram.)

Sample tract of 3.8 acres, being 1 per cent., in a Beech and Oak forest at *x*.

Number of trees.	Diam. at breast-height.	Sums of the areas at breast-height for every inch class.	Height of trees from breast-height to top.	Absolute Factors of Shape.	Cubic contents of the stems above breast-height.*
	Inches.	*Sq. Feet.*	*Feet.*		*Cu. Feet.*
121	3	5.94	22.5	.50	66.8
27	4	2.36	25.5	.50	30.1
19	5	2.59	29.5	.50	38.2
15	6	2.94	37.5	.49	54.
13	7	3.47	42.5	.49	72.3
14	8	4.89	45.5	.48	106.8
8	9	3.53	48.5	.48	82.2
9	10	4.91	51.5	.48	121.4
9	11	5.94	55.5	.47	154.9
11	12	8.64	57.5	.47	234.
13	13	11.98	59.5	.47	335.
17	14	18.17	64.5	.47	550.8
14	15	17.18	69.5	.46	549.2
12	16	16.76	73.5	.46	566.7
12	17	18.92	76.5	.46	665.5
10	18	17.67	79.5	.46	646.2
9	19	17.72	81.5	.45	649.9
7	20	15.27	83.5	.45	578.3
6	21	14.43	86.5	.45	561.7
5	22	13.20	88.5	.44	514.
4	23	11.54	89.5	.44	454.4
2	24	6.28	91.5	.44	255.6
1	25	3.41	92.5	.43	135.6
2	26	7.37	93.5	.43	296.3
1	27	3.98	94.5	.42	158.
2	28	8.55	94.5	.42	339.3
1	29	4.59	95.5	.42	184.1
1	30	4.91	97.5	.42	201.1
	Total,	257.14	Total,		8602.4

b.—For the stem portion below breast-height, excluding the stump left on the ground. (See *b* in the diagram.)

Breast height,	4 ft. 3 in.
Less height of stump,	1 " 3 "
Length of *b*, excluding stump,	3 " 0 "
Total basal area (column 3 in the table),	257.14 sq. ft.
Product (equals volume),	771.4 cu. ft.†

*** The figures in column six were obtained by the multiplication of those in the three columns preceding; or, in other words, by reducing with the aid of the factors of shape the contents of the imaginary cylinders represented by the figures in columns three and four.**

† It will be noticed that no allowance is made for the flare of the roots, or the tapering at the butt end of the stem. The difference would be slight and may be allowed to cover part of the breakage and waste.

c.—For the branches.

Since the solid cubic contents of the branches were found in connection with the sample trees felled for obtaining the factors of shape, the percentage which the former bear to the stem volume of those trees, within each species, can be readily found. The butt end stem contents should, of course, be added to those of the upper portion before determining the percentage. The percentage having thus, in the present instance, been ascertained to be fifteen, the total for Beech is as follows:

For the parts	*a*	8602.4 cubic feet.
For the parts	*b*	771.4 " "
For the entire stems		9373.8 cubic feet.
For branches, 15 %		1406.0 " "
Total		10779.8 cubic feet.

By dividing by 128, and then by the reducing factor .7, the cords may be obtained. Thus 10779.8 cubic feet equal 120.3 cords.

How to Shorten the Work.

As a rule, more or less of the detail necessarily included in the explanation of the method can be dispensed with in practice. The forest may be so regular as to have the sizes nearly consecutive and in approximately equal proportions, in which case they may be combined into classes with average heights, or even a general height average may be taken. In the latter case the factors of shape would be likely to show a normal and gradual transition, and could then also be averaged. It may even happen that several species are so nearly alike in their rates of growth that they may be treated as one in the finding of the heights and factors of shape. Moreover, since the "absolute factor of shape" refers merely to the stem above breast-height and not, as ordinarily, to the whole tree, the estimator, after a little practice, is able to judge pretty accurately of its value. Sometimes it is no great risk to estimate the factor of shape of a tree outright, without felling it. Ordinarily, the "absolute factor of shape" tends to lie between .4 and .5, except for very small trees.

Advantages of the Method.

Its principal merit lies in its adaptability to the varying conditions of American forests.

The lower lengths, for instance, can be corrected in accordance with the size of stump customarily left in this, that, or the other, section of the country. The factor of shape, being confined within comparatively narrow limits, may be readily altered to coincide with changing conditions of growth. Moreover, the several parts of the tree can be so separated in the measurement and computation as to meet the special needs of the case. Finally, there is no reason why the board feet contents should not be noted in connection with the stem volume measurements of the sample trees, thus enabling the estimator to present figures showing both the board foot supply and the cubic contents that constitute the basis for production in the forest. The results in board measure cannot, of course, be expected to be any more accurate by being merely joined to the new method than they would be under ordinary circumstances.

There are two other methods of forest mensuration which could be compared with that under consideration. The one based on the so-called "artificial" factors of shape would be invaluable to us were it not that European forests are entirely different in type as well as in composition of species; while the method known as Draudt's necessitates the felling of a great number of sample trees, and is much less elastic than the one described.

The method by the "absolute factor of shape" is a conservative one. In Denmark it has been used extensively and has given entire satisfaction. In the German Beech and Oak forest that supplied the example for this article it proved more accurate than the measurements by "artificial" factors, which were used to arrive at a comparison. To my knowledge it has been tested but twice in America. In both instances the results were fairly satisfactory.

G. Fred Schwarz,
Washington, D. C.

The Bigtrees of California.

Description of the Groves which Congress has been Asked to Preserve from the Energy of Lumbermen.

Before the glacial period, the genus of big trees called *Sequoia* flourished widely in the temperate zones of three continents. There were many species, and Europe, Asia and America each had their share. But when the ice-fields moved down out of the north, the luxuriant vegetation of the age declined, and with it these multitudes of trees. One after another the different kinds gave way, their relics became buried, and when the ice receded, there were left in all the world, just two species of the genus. Both grew in California, each separate from the other, and each occupying, in comparison with its former territory, a mere island of space. As we know them now, the Redwood (*Sequoia sempervirens*) lives only in the Coast ranges and the region of the sea fogs, along a narrow strip, ten to thirty miles wide, from the Oregon line to the Bay of Monterey; the Bigtree (*Sequoia washingtoniana*) lives only on the west slope of the Sierra Nevada, in small groves scattered over a length of two hundred and fifty miles. The utmost search reveals but ten main groups; it is hardly extravagant to limit the total number of sizeable trees to figures in the thousands; and it is the plain truth that all the specimens put together which are famous for their size, they do not exceed five hundred.

The Bigtrees are unique in the world—the grandest, the largest, the most graceful of trees; and if it were not enough to be all these, they are among the scarcest of known species, and have the extreme scientific value of being the best living representative of a previous geologic age. The tree has come down to us through the vicissitudes of many centuries because it has had superb qualifications. Its bark is often two feet thick and almost non-combustible; the oldest specimens that have been felled were still sound at the heart; and fungus is an enemy unknown to it. Yet with all these means of maintenance, the Bigtrees have apparently not increased their range since the glacial epoch. On their own little strip of country, where the climate was locally favorable, they have just managed to hold their own.

As the situation stands to-day, the only grove of consequence, which is absolutely safe from destruction, the Mariposa, is far from being the most interesting. Most of the others are either in process, or in danger, of being logged. The very finest of all, the Calaveras, with the biggest and tallest trees, the most uncontaminated surroundings, and practically all the literary and scientific associations of the species connected with it, is bonded to a lumberman who came into full possession on the first of April, 1900; the Sequoia and General Grant national parks, which are supposed to embrace and secure a large part of the remaining Bigtrees, are eaten into with a saw-mill each, and valid private timber claims amounting to a total of 1172.87 acres; and for the rest of the scanty patches, they are in a fair way to disappear — in Calaveras, Tuolumne, Fresno and Tulare counties they are disappearing—by the axe. In brief, the majority of the Bigtrees of California, certainly the best of them, are owned by people who have every right, and in many cases, every intention, to cut them up into boards.

These are the main facts of the case. To realize more fully the loss we are likely to suffer is a matter for imagination. One must remember the history of these trees, their individual age, their size, their fame, their beauty. A notion of their wonders may be got from John Muir's Mountains of California. No one describes the Sequoias more vividly than he:

"So exquisitely harmonious and finely balanced are even the mightiest of these

monarchs of the woods in all their proportions and circumstances, there is never anything overgrown or monstrous-looking about them. On coming in sight of them for the first time, you are likely to say 'Oh see what beautiful, noble-looking trees are towering there among the firs and pines!' their grandeur being in the meantime in great part invisible, but to the living eye it will be manifested sooner or later, stealing slowly on the senses, like the grandeur of Niagara, or the lofty Yosemite domes. Their great size is hidden from the inexperienced observer as long as they are seen at a distance in one harmonious view. When, however, you approach them and walk round them, you begin to wonder at their colossal size and seek a measuring-rod. These giants bulge considerably at the base, but not more than is required for beauty and safety; and the only reason that this bulging seems in some cases excessive is that only a comparatively small section of the shaft is seen at once in near views. One that I measured in the King's Rivers forest was 25 feet in diameter at the ground and 10 feet in diameter 200 feet above the ground, showing that the taper of the trunk as a whole, is charmingly fine. And when you stand back far enough to see the massive columns from the swelling instep to the lofty summit dissolving in a dome of verdure, you rejoiced on the unrivaled display of combined grandeur and beauty. About a hundred feet or more of the trunk is usually branchless, but its massive simplicity is relieved by the bark furrows, which instead of making an irregular network, run evenly parallel, like the fluting of an architectural column, and to some extent by tufts of slender sprays that wave lightly in the winds and cast flecks of shade, seeming to have been pinned on here and there for the sake of beauty only. The young trees have slender, simple branches down to the ground, put on with strict regularity, sharply aspiring at the top, horizontal about half-way down, and drooping in handsome curves at the base. By the time the sapling is five or six hundred years old this spiry, feathery, juvenile habit merges into the firm, rounded dome form of middle age, which in turn takes on the eccentric picturesqueness of old age. No other tree in the Sierra forest has foliage so densely massed or presents outlines so firmly drawn and so steadily subordinate to a special type. A knotty ungovernable-looking branch five to eight feet thick may be seen pushing out abruptly from the smooth trunk, as if sure to throw the regular curves into confusion, but as soon as the general outline is reached it stop short and dissolves in spreading bosses of law-abiding sprays, just as if every tree were growing beneath some huge invisible bell-glass, against whose sides every branch was being pressed and molded, yet somehow indulging in so many small departures from the regular form that there is still an appearance of freedom. The foliage of the saplings is dark bluish-green in color, while the older trees ripen to a warm brownish-yellow tint like Libocedrus. The bark is the rich cinnamon brown, purplish in young trees and in shady portions of the old, while the ground is covered with brown leaves and burs forming color-masses of extraordinary richness, not to mention the flowers and underbrush that rejoice about them in their seasons. Walk the Sequoia woods at any time of the year and you will say they are the most beautiful and majestic on earth. Beautiful and impressive contrasts meet you everywhere: the color of tree and flower, rock and sky, light and shade, strength and frailty, endurance and evanescence, tangles of supple hazel-bushes, tree-pillar about as rigid as granite domes, roses and violets, the smallest of their kind, blooming around the feet of the giants, and rugs of the chamcæbatia where the sunbeams fall. Then in winter the trees themselves break forth in bloom, myriads of small four-sided staminate cones crowd the ends of the slender sprays, coloring the whole tree, and when ripe dusting the air and the ground with golden pollen. The fertile cones are bright grass-green, measuring about two inches in length by one and a-half in thickness, and are made up of about forty firm, rhomboidal scales densely packed, with from five to eight seeds at the base of each,

a single one, therefore, contains from two to three hundred seeds, which are about a fourth of an inch long by three sixteenths wide, including a thin, flat margin that makes them go glancing and wavering in their fall like a boy's kite. The fruitfulness of Sequoia may be illustrated by two specimen branches, one and a half and two inches in diameter, on which I counted 480 cones. No other Sierra conifer produces nearly so many seeds. Millions are ripened annually by a single tree, and in a fruitful year the product of one of the northern groves would be enough to plant all the mountain ranges of the world. Nature takes care however, that one seed in a million shall germinate at all, and of those that do perhaps not one in ten thousand is suffered to live through the many vicissitudes of storm, drought, fire, and snow-crushing that beset their youth."

Of their age Mr. Muir says:

"Under the most favorable conditions these giants probably live 5000 years or more, though few of even the larger trees are more than half as old. I never saw a Big Tree that had died a natural death; barring accidents they seem to be immortal, being exempt from all the diseases that afflict and kill other trees unless destroyed by man, they live on indefinitely until burned, smashed by lightning, or cast down by storm, or by the giving way of the ground on which they stand. The age of one that was felled in the Calaveras Grove, for the sake of having its stump for a dancing-floor was about 1300 years, and its diameter, measured across the stump, 24 feet inside the bark. Another that was cut down in the King's River forest was about the same size, but nearly a thousand years older (2000 years), though not a very old-looking tree. It was felled to procure a section for exhibition, and thus an opportunity was given to count its annual rings of growth. The collossal scarred monument in the King's River forest mentioned above is burned half way through, and I spent a day in making an estimate of its age, clearing away the charred surface with an axe and carefully counting the annual rings with the aid of a pocket-lens. The wood-rings in the section I laid bare were so involved and contorted in some places that I was not able to determine its age exactly, but I counted over 4000 rings, which showed that this tree was in its prime, swaying in the Sierra winds, when Christ walked the earth. No tree in the world, as far as I know, has looked down on so many centuries as the Sequoia, or opens such impressive and suggestive views into history."

Professor Brewer writes of the Calaveras Grove:

"'The Calaveras Grove' is the one nearest San Francisco. It was the first one discovered and has been more visited than any of the other groves, and all in all, is the best preserved and the most interesting of those left. There has been so much written about it, and so many have seen it, and it has become so well known to the world, that a special description is unnecessary here. It became private property almost immediately after its discovery, almost fifty years ago, and for some years it has belonged, it is understood, to Mr. James L. Sperry, of Stockton. He has long wished that it might become public property and several attempts have been made, both to the state and the general government, to have the property become a public park."

"About eight years ago when the United States set aside the Yosemite Park, an effort was made to persuade the officials at Washington to extend the boundaries of the reservation so as to include the Calaveras Grove. The title of the intervening land was then in the government, and there were no difficulties in the way of such an extension of boundaries, except that the national authorities were not awake to its importance, and the public was indifferent as to who owned the grove so long as it could be seen and visited by any one."

These extracts represent a few of the claims which the Bigtrees have already made upon the world's interest. They could be extended almost indefinitely. Just now it is more important that people should know what threatens the trees as a species, and what has and may be done for their protection.

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monarchs of the woods in all their proportions and circumstances, there is never anything overgrown or monstrous-looking about them. On coming in sight of them for the first time, you are likely to say 'Oh see what beautiful, noble-looking trees are towering there among the firs and pines!' their grandeur being in the meantime in great part invisible, but to the living eye it will be manifested sooner or later, stealing slowly on the senses, like the grandeur of Niagara, or the lofty Yosemite domes. Their great size is hidden from the inexperienced observer as long as they are seen at a distance in one harmonious view. When, however, you approach them and walk round them, you begin to wonder at their colossal size and seek a measuring-rod. These giants bulge considerably at the base, but not more than is required for beauty and safety; and the only reason that this bulging seems in some cases excessive is that only a comparatively small section of the shaft is seen at once in near views. One that I measured in the King's Rivers forest was 25 feet in diameter at the ground and 10 feet in diameter 200 feet above the ground, showing that the taper of the trunk as a whole, is charmingly fine. And when you stand back far enough to see the massive columns from the swelling instep to the lofty summit dissolving in a dome of verdure, you rejoiced on the unrivaled display of combined grandeur and beauty. About a hundred feet or more of the trunk is usually branchless, but its massive simplicity is relieved by the bark furrows, which instead of making an irregular network, run evenly parallel, like the fluting of an architectural column, and to some extent by tufts of slender sprays that wave lightly in the winds and cast flecks of shade, seeming to have been pinned on here and there for the sake of beauty only. The young trees have slender, simple branches down to the ground, put on with strict regularity, sharply aspiring at the top, horizontal about half-way down, and drooping in handsome curves at the base. By the time the sapling is five or six hundred years old this spiry, feathery, juvenile habit merges into the firm, rounded dome form of middle age, which in turn takes on the eccentric picturesqueness of old age. No other tree in the Sierra forest has foliage so densely massed or presents outlines so firmly drawn and so steadily subordinate to a special type. A knotty ungovernable-looking branch five to eight feet thick may be seen pushing out abruptly from the smooth trunk, as if sure to throw the regular curves into confusion, but as soon as the general outline is reached it stop short and dissolves in spreading bosses of law-abiding sprays, just as if every tree were growing beneath some huge invisible bell-glass, against whose sides every branch was being pressed and molded, yet somehow indulging in so many small departures from the regular form that there is still an appearance of freedom. The foliage of the saplings is dark bluish-green in color, while the older trees ripen to a warm brownish-yellow tint like Libocedrus. The bark is the rich cinnamon brown, purplish in young trees and in shady portions of the old, while the ground is covered with brown leaves and burs forming color-masses of extraordinary richness, not to mention the flowers and underbrush that rejoice about them in their seasons. Walk the Sequoia woods at any time of the year and you will say they are the most beautiful and majestic on earth. Beautiful and impressive contrasts meet you everywhere: the color of tree and flower, rock and sky, light and shade, strength and frailty, endurance and evanescence, tangles of supple hazel-bushes, tree-pillar about as rigid as granite domes, roses and violets, the smallest of their kind, blooming around the feet of the giants, and rugs of the chamcæbatia where the sunbeams fall. Then in winter the trees themselves break forth in bloom, myriads of small four-sided staminate cones crowd the ends of the slender sprays, coloring the whole tree, and when ripe dusting the air and the ground with golden pollen. The fertile cones are bright grass-green, measuring about two inches in length by one and a-half in thickness, and are made up of about forty firm, rhomboidal scales densely packed, with from five to eight seeds at the base of each,

a single one, therefore, contains from two to three hundred seeds, which are about a fourth of an inch long by three sixteenths wide, including a thin, flat margin that makes them go glancing and wavering in their fall like a boy's kite. The fruitfulness of Sequoia may be illustrated by two specimen branches, one and a half and two inches in diameter, on which I counted 480 cones. No other Sierra conifer produces nearly so many seeds. Millions are ripened annually by a single tree, and in a fruitful year the product of one of the northern groves would be enough to plant all the mountain ranges of the world. Nature takes care however, that one seed in a million shall germinate at all, and of those that do perhaps not one in ten thousand is suffered to live through the many vicissitudes of storm, drought, fire, and snow-crushing that beset their youth."

Of their age Mr. Muir says:

"Under the most favorable conditions these giants probably live 5000 years or more, though few of even the larger trees are more than half as old. I never saw a Big Tree that had died a natural death; barring accidents they seem to be immortal, being exempt from all the diseases that afflict and kill other trees unless destroyed by man, they live on indefinitely until burned, smashed by lightning, or cast down by storm, or by the giving way of the ground on which they stand. The age of one that was felled in the Calaveras Grove, for the sake of having its stump for a dancing-floor was about 1300 years, and its diameter, measured across the stump, 24 feet inside the bark. Another that was cut down in the King's River forest was about the same size, but nearly a thousand years older (2000 years), though not a very old-looking tree. It was felled to procure a section for exhibition, and thus an opportunity was given to count its annual rings of growth. The collossal scarred monument in the King's River forest mentioned above is burned half way through, and I spent a day in making an estimate of its age, clearing away the charred surface with an axe and carefully counting the annual rings with the aid of a pocket-lens. The wood-rings in the section I laid bare were so involved and contorted in some places that I was not able to determine its age exactly, but I counted over 4000 rings, which showed that this tree was in its prime, swaying in the Sierra winds, when Christ walked the earth. No tree in the world, as far as I know, has looked down on so many centuries as the Sequoia, or opens such impressive and suggestive views into history."

Professor Brewer writes of the Calaveras Grove:

"'The Calaveras Grove' is the one nearest San Francisco. It was the first one discovered and has been more visited than any of the other groves, and all in all, is the best preserved and the most interesting of those left. There has been so much written about it, and so many have seen it, and it has become so well known to the world, that a special description is unnecessary here. It became private property almost immediately after its discovery, almost fifty years ago, and for some years it has belonged, it is understood, to Mr. James L. Sperry, of Stockton. He has long wished that it might become public property and several attempts have been made, both to the state and the general government, to have the property become a public park."

"About eight years ago when the United States set aside the Yosemite Park, an effort was made to persuade the officials at Washington to extend the boundaries of the reservation so as to include the Calaveras Grove. The title of the intervening land was then in the government, and there were no difficulties in the way of such an extension of boundaries, except that the national authorities were not awake to its importance, and the public was indifferent as to who owned the grove so long as it could be seen and visited by any one."

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Through coöperation with the Sheffield Scientific School and the Peabody Museum, the use of the extensive botanical, mineralogical and zoölogical collections of these departments will be extended to the Forest School.

Provision is also made in the gift for a Summer School of Forestry at Grey Towers, Milford, Pike County, Pa., the estate of Mr. James W. Pinchot, a portion of which has been placed at the disposal of the Forest School for 21 years. The estate contains a tract of woodland for practical forest instruction, with open ground for planting, and the donors have offered to furnish such equipment as may be necessary for the school. Mr. J. W. Pinchot has further generously agreed to place in the public library in the village of Milford, for the use of the school, a large collection of books relating to Forestry.

It is the intention of the governing board to select considerable areas of forest land near New Haven where the students will be given practical forest work throughout the first year and first half of the second year. The courses have been so arranged that the entire spring of the second year will be spent in the field in Pennsylvania and in the Adirondack Mountains of New York. The tract of land at Milford, Pa., will also be used for practical field work during the first part of the spring term of the second year. The land is admirably adapted to forest instruction, since it represents the average conditions prevailing in the eastern hardwood region. Several owners of large tracts in the Adirondacks have offered the use of their land for the practical forest work of the school, and have expressed their willingness to construct and equip camps for the accommodation of the students.

The requirements of the course will be strict in order to ensure the highest standard, and a degree will probably be granted by the university, though this has not been definitely settled. Though primarily for graduate students, it has been decided that under exceptional circumstances students who are not candidates for a degree, but who can show their fitness to pursue the courses given in the Forest School, may be admitted without examination. It will be the policy of the governing board, however, to encourage the students to take the full course at the Forest School, rather than a special or partial course; and those students who wish to take a short course in forestry, and are unable to pass the entrance examinations to the Yale Forest School, will be advised to avail themselves of the privileges offered by the Summer School at Milford, which is intended to meet their special requirements.

Graduates of colleges or scientific schools of high standing will be admitted without examination provided they can show the requisite knowledge of botany, geology, and inorganic chemistry. Candidates who are not graduates from collegiate institutions of high standing will be required to pass an examination in the various branches of mathematics, botany, geology, chemistry, physics, German or French, English and political economy. Examinations for entrance may be taken in June, in any of the cities from Maine to California, where the tests are held for admission to other departments of Yale.

The regular course covers a period of two years. The subjects have been so arranged that nearly all the preliminary work is completed in the first year. Enough technical forestry is, however, given during the first year to enable the students to make silvicultural studies, to investigate the growth and production of trees and forests, to establish forest plantations, and to make thinnings and other classes of cuttings. The second year is devoted to advanced technical work in the class room and in the field.

The purpose of the Summer School at Milford is primarily to provide instruction for those who can not attend the Forest School at New Haven. The latter is a graduate school and the strict requirements for admission will probably exclude many who have not had the requisite training but who may wish to take a general course in forestry. Such students may be classified as follows: 1. Owners of woodlands. 2. Forest rangers. 3. Teachers and others who wish to acquire a general

knowledge of forestry. 4. Students of forestry who wish to occupy their vacation in practical forest work. 5. Students of forestry who are deficient in certain subjects. 6. Graduate students desirous of pursuing advanced forest work. 7. Possible students of forestry who desire to investigate the subject.

The Summer School will be opened in July, 1901. The regular course of instruction will cover, in general, the technical work given the first year at the Yale School of Forestry. Informal lectures will be given upon the nature and scope of forestry, upon silviculture, forest measurements and forest botany. Practical instruction will be given in the woods in marking thinnings and other cuttings, in establishing plantations, taking forest measurements, and in other forest work useful to those taking the courses. The professor in charge of the school will direct the studies of those who may wish to carry on special forest work.

Grazing in the Western Forest Reserves.

An Official Investigation of the Facts to be Made by the Division of Forestry, Upon Request of the Secretary of the Interior to the Secretary of Agriculture.

The question of grazing in the Western forest reserves has been taken up by the Department of the Interior for a complete investigation of the claims advanced by the advocates and opponents of the opening of the reserves to sheep-grazing. Secretary Hitchcock has lately written Secretary Wilson, of the Department of Agriculture, asking that the Division of Forestry investigate the effect of sheep-grazing on the forests, and an inquiry will be begun at once. As no general rule can be applied, each reserve will be studied separately.

This work will be conducted by the Division of Forestry, which has prepared a comprehensive plan for securing information.

As it is desired to collect impartially the testimony of both sides, lists of questions will be sent to the thousands of sheep-grazers and their opponents for the expression of individual opinions concerning the effect of grazing. This information will be used later in connection with the official examination of the reserves, which will begin July 1, in which botanists, irrigation experts and other scientific men from all parts of the United States and also all will be engaged for several months in the field.

In the letter referred to above, Secretary Hitchcock enumerates the points upon which he desires to lay special emphasis, as follows:

"Grazing in the national forest reserves, being one of the most important of all the questions which relate to them, will naturally form a chief subject of the reports. In the necessary investigations and in preparing these reports, I have the honor to request that special attention be given to the following phases of the subject:

"1. The grazing industry in the forest reserves in relation to taxation and the general prosperity of specified localities.

"2. The relation of grazing to forest fires.

"3. The relation of grazing to the preservation and reproduction of forests.

"4. The relation of grazing to irrigation and water supply.

"5. The relative effect of grazing by various kinds of stock.

"6. Moderate grazing and over-grazing in forest reserves."

The present investigation has been brought about largely by the controversy which has raged for many years in the West, involving cattlemen, wool-growers and farmers throughout that entire section.

The recent increase of irrigation has added to the bitterness. Government action in the matter has been hastened by the establishment of forest reserves. In view of the injury to the forests in many sections from over-grazing, all reserves except those in Washington and Oregon, and the Black Mesa Reserve, in Arizona, which is to be opened to 300,000 sheep at 3 cents a head, are closed to sheep by an order issued last May. This step has raised a storm of protest from wool-growers, who claim that no harm is done by grazing under proper restrictions. Many are reported to have driven their herds into the mountains last summer in defiance of the law.

Against the sheep owners are arrayed the cattlemen and farmers, and especially the irrigators, who claim the practice means disaster to agriculture in the lowlands. These argue that sheep destroy the forest cover in the mountains and thus diminish the water supply. They are said not only to eat the young growth which is to perpetuate the forest, but to trample innumerable seedlings and destroy the layer of leaves necessary to keep the soil in good condition. Sheep herders are accused of burning large areas in order to secure a growth of grass. While the government will decide the matter only in the case of the forest reserves, these include a large part of all the summer ranges of the western sheep-raising states, and the results will be of great importance to the American wool-growing industry.

Canadian Forestry Association.

A New Organization of Prominent Men to Advance the Principles of Scientific Forestry.

The Canadian Forestry Association was organized March 8th at the House of Commons, Ottawa. An interesting comment upon the new organization, in which the influence of the American Forestry Association, and one of its members, Hon. Elihu Stewart, is mentioned, is thus spoken of in the Ottawa *Citizen* of the following day:

"So imperative had it become that steps should be at once taken to protect Canada's forest resources that Mr. E. Stewart, chief inspector of timber and forestry sent out invitations to those interested in forest matters to attend a meeting to organize a Canadian Forestry Association. The idea found favor and a large and representative number of those interested met yesterday at the House of Commons and organized the association, which will be conducted along the same lines as is the American Forestry Association, which has already achieved such satisfactory results in the United States."

The Governor-General of Canada, Lord Minto, is to be invited to act as honorary president. The officers, nearly all of whom are prominent members of the American Forestry Association, are:

President, Sir Henry Joly de Lotbiniere; vice-president, Wm. Little; secretary, Elihu Stewart, chief inspector of timber and forestry for the Dominion; treasurer, C. J. Booth; a board of seven directors, and vice-presidents for each of the provinces and territories.

Approval of Minnesota Park Project.

At a meeting of the Board of Directors of the American Forestry Association, at the office of the Secretary of Agriculture, Washington, D. C., on Saturday, March 24th, official action was taken endorsing the proposed national park in Minnesota, of which project frequent mention has been made in THE FORESTER.

Pennsylvania's Interest in Forestry.

The active efforts of the Pennsylvania State Forest Commission for the preservation and restoration of forests on the watersheds of the State have made a most favorable impression on the general public, so that the following proclamation of Governor Stone, appointing "Arbor Days," has been received with universal interest and approbation:

In the name and by authority of the Commonwealth of Pennsylvania.—Executive Department.

Proclamation.

It is my pleasant duty to again call the attention of the citizens of this Commonwealth to the time-honored custom of systematically planting trees and shrubs and thus in a measure repairing the injury caused by a too rapid destruction of our forests. The inestimable benefits of this custom are evidenced not only by the increasing beauty of our parks and avenues, but by the interest which our people are taking in the necessity and benefits of larger wooded areas. Through the efforts of scientific wood culture, young forests are springing up in different parts of the State, and it will not be long before an appreciable change will be noticed in the flow of the waters of our State.

Especially should Arbor Day be observed in view of the fact that the State, in compliance with several Acts of Assembly creating forest reserves, is now purchasing forest lands. This has greatly increased the market value of similar wooded tracts, and a larger revenue should come to the counties from taxes levied upon them. The results in other countries show that there will soon be a considerable revenue to the State from the sale of merchantable timber taken from its reserves, but the immediate benefit is to the people, who will have the right to go upon these lands for fishing, hunting, outing and camping without feeling themselves liable as trespassers. Our cities have their parks maintained at great expense. These forest reserves will be the people's parks, free to all who comply with the laws for their preservation. In calling the attention of those observing Arbor Day to the purchase of forest lands by the State, it is with the hope that the action of the State officials in putting in force the laws creating forest reserves may meet with public approval and that the sentiment favorable thereto may be strengthened.

In order that our citizens, both young and old, may continue to contribute their share in this great movement

I, William A. Stone, Governor of the Commonwealth of Pennsylvania, in accordance with law, do hereby designate and proclaim Friday, the Sixth day of April, and Friday, the Twentieth day of April, A. D. 1900, to be observed as Arbor Days throughout the Commonwealth.

Two days are set apart for the observance of Arbor Day. Inasmuch as the climatic conditions may render one of these days more favorable for the purpose intended than the other, the selection is left with the citizens of the various sections of the Commonwealth.

Given under my hand and the Great Seal of the State at the City of Harrisburg, this Ninth day of March in the year of our Lord one thousand nine hundred, and of the Commonwealth the one hundred and twenty-fourth.

WILLIAM A. STONE.

By the Governor
W. W. GRIEST,
Secretary of the Commonwealth.

Studying American Forests.

Field Investigations.

E. M. Griffith, field-assistant of the Division of Forestry, who left Washington a month ago to make field investigations, has already examined a number of large tracts in Missouri and Arkansas. One of these is a tract in Dunklin County, in the southeastern part of Missouri consisting of about 54,000 acres in one solid body. The timber is largely Ash, Hickory, and Oak, with some Honey-locust and Persimmon; in one or two sections Cypress is found in considerable quantity. The timber is estimated to cut 12,000 feet per acre, and is very tall, clean, and free from decay. Taken all together, it is a remarkably fine body of hardwood.

As a result of this examination, the owners—the Deering Harvester Company—have made definite application for a complete working plan for the property, with the view of managing it on the lines of conservative forestry.

Mr. Griffith has made the preliminary examination of two tracts in Arkansas, but as yet the owners have not taken action upon the reports made. The timber lands examined near Malvern and Perla, Ark., consist of 15,000 acres of Pine, most of which has been cut-over once, and in some cases twice. About 20,000 acres additional, which were examined in the same localities, are mainly virgin forest, lying for the most part in the Pine flats. The timber lands at Pine Bluff, Ark., consist of 85,000 acres in Grant, Jefferson and Saline counties, the main timber being Short-leaf Pine (*Pinus echinata*), with a considerable amount of Oak, Hickory and Gum.

Mr. Griffith has now proceeded to the Black Hills Forest Reserve, where he is making a detailed working-plan. This is the beginning of the work on the Forest Reserves by the Division of Forestry. Later assistants will join in the work which will be continued throughout the entire summer.

Timber Measurements.

A single acre of Washington timber, recently measured by the Division of Forestry, contained 218,690 feet B. M. of Red Fir, 11,000 feet of Hemlock, and 6000 feet of Cedar; making a total stand of 236,690 feet. The smallest Fir on the acre was 3 feet in diameter and the largest 8 feet. The height of the forest approximated 300 feet. The Hemlock was scaled down to 20 inches in diameter and had it been scaled to 12 or 14 inches, as customary in the East, the stand would have been several thousand feet greater. This acre was measured near Wilkeson, Washington, about 30 miles from Tacoma.

The average stand per acre for 131 acres measured by the same party near Buckley, in the same county, was 74,402 feet of Red Fir, 30,105 feet of Hemlock, 5000 feet of Cedar, 2175 feet of Spruce and 593 feet of White Fir; a total stand of 112,276 feet. In these measurements no trees less than 2 feet in diameter were scaled. No allowance, however, was made in the above calculation for cull. The 131 acres were taken in various parts of a township and represents with fair accuracy the stand throughout that township. The significance of these figures is apparent when it is remembered that 10,000 feet per acre is considered a heavy stand in all lumber regions east of the Mississippi.

Forest Valuation.

In connection with the investigations of commercial trees by the Division a set of tables has been prepared for the Adirondack hardwoods, by which various financial calculations can be made accurately and easily if the approximate number of trees on a given area and average diameter are known. The most important tables show: The value of mature trees at different stumpage rates; value of immature trees of all ages at different stumpage rates; interest represented by annual growth on

the capital represented by the trees; and interest represented by annual growth in board feet on capital represented by land.

From these tables the timber owner can find the exact financial gain in waiting for his timber to grow to any given diameter, the interest his forest is earning on its cost, and similar valuable information. The tables are now complete for the so-called Adirondack hardwoods, including Yellow Birch, Sugar Maple, Beech, Basswood and Cherry.

These hardwood tables are based upon analyses of 1000 felled trees and upon actual measurement of the merchantable timber upon 1000 acres.

A Study of Hemlock.

The western Hemlock is to be the subject of a special investigation this summer by the Division of Forestry and a party of experts will spend several months in the Puget Sound region making observations and measurements of that speeies of Hemlock.

Although one of the largest and most widely distributed trees in the Pacific Northwest, it suffers from the prejudice against the eastern Hemlock, a closely allied, but much inferior species, and for this reason has almost no commercial value. It grows at its best on the cool damp slopes of the Washington and Oregon mountains, where it is frequently 200 feet high and 10 feet in diameter, or even larger in favorable situations. It occasionally forms a dense, pure forest, but is more often mixed with Red Fir, the most important timber tree of the Northwest, and is usually left standing by the lumbermen because there is no sale for the lumber.

The wood of the western Hemlock is less apt to be shaky, is stronger, more durable, and more easily worked than that of the eastern species. The bark is said to contain much more tannin.

By the present method of lumbering, immense quantities of Hemlock are destroyed annually, for it is left to be burned by the fires which frequently follow the removal of the Fir. It is believed that if this Hemlock can be given its true value before the public, logging methods may be modified, and even if the market develops slowly, there will be a greater effort to prevent waste.

An important feature of this investigation will be to ascertain the rate of growth and the time required to produce a merchantable stand. The western Hemlock possesses remarkable powers of reproduction and may be counted on to reforest logged-off areas.

Tree Planting Plans.

A plan has been arranged by which the section of Tree Planting of the Division of Forestry will combine lecturing with its practical field work for the purpose of interesting the public in the subject. When an official of this section of the Division is called to any portion of the United States where planting is especially desirable, he will arrange for a series of meetings of land-owners, to whom he will explain the objects of the Division and the free assistance offered to those desirous of making a trial of planting.

The Forest Exhibit at Paris.

The exhibit of the Division of Forestry for the Paris Exposition is now complete and on the way to Paris. It will be one of the most novel of the Government exhibits and will be wholly distinct from the commercial features of lumbering to be shown in another department.

The display will be in the form of an angled corridor, the walls of which consist of large transparencies illustrating American forest conditions. These walls will be double and illuminated by interior electric lights. The pictures range in size from 3 by 5 feet to 4 by 6 feet. There will be two transparencies 6 by 10 feet, portraying groves of Red Fir and California Bigtrees, two of the most impressive American trees.

A point will be made of the relation of forestry to agriculture, and such subjects as protective forests, the use of trees in preserving water supply, the management of woodlands, etc., are fully illustrated. Many photographs and maps will be shown.

Along the Smoky Range.

The wildest and most naturally beautiful part of this country east of the Rocky Mountains is that region where North Carolina, Tennessee, Virginia, South Carolina and Georgia approach each other. It is a mountain country with an average elevation of 4000 feet, and peaks running up thousands of feet higher. The tallest mountain east of the Rockies is in North Carolina.

This wild region abounds in timber and is still a natural and unbroken wilderness except as the lumbermen invade its quiet. They have come. Already traffic in forest land is active and the railroads of the vicinity are loaded with lumber for market. Let the American people sit by with their accustomed optimistic apathy, and before long the forests will be gone, the water courses left to dry up, the bears, deer and other wild animals killed off, and nothing but a fading memory remain of what is now a great natural park.

The general government ought to step in before it is too late and take possession of the whole region. Leading citizens of North Carolina and other States adjoining have recently held a meeting and formed themselves into the Appalachian National Park Association, to push the park project. It ought to go without much pushing. All that is needed is to set people thinking about it.

Look at what the government might do, and at what, on the contrary, will be done if the national government does not come in and protect nature there. Once done, the mischief could never be undone. The loss would not be local but national. Everybody who fails to see the North Carolina mountains suffers a direct loss, whether he knows it or not. Open the region to the whole country and let these sights be assured and available at all times, and the park would be one of the most popular resorts of the United States.

Congress ought to jump at the chance to get possession of the great tract—at least 500,000 acres said to be purchasable now at hardly more than nominal figures. The cost of a single battleship would give us this park, available for future generations as well as for ourselves. It is to be hoped the committee will set the work going early and carry it to the success that the American people will wish for it and for themselves.—Hartford *Courant*.

Recent Legislation.

The joint resolution of Congress for the acquisition of the "Mammoth Tree Grove" and "South Park Grove of Big Trees" in Calaveras County, Cal., was introduced in the Senate by Mr. Perkins of that State. The bill recited the fact that "the trees *Sequoia gigantea* of these groves constitute the largest collection and probably the finest specimens of the same in the world;" and "the destruction of these trees would be an irredeemable loss to science, and the loss of one of the marked wonders of the world." The progress of the negotiations begun under direction of Congress is appended to the article in this issue on "The Big Trees."

The leasing of the arid public lands of the United States is the subject matter of bills introduced in the Senate by Mr. Foster, of Washington, and in the House by Mr. Stephens, of Texas, by request, declaring that the grazing lands instead of being open to public use, shall be leased. In the Senate bill, one-half of the revenue derived is to be given to the general government and the other half to the State in which the lands are situated. In the House bill, one-half is to be used for surveys and irrigation works, and the other half is to be equally divided between the State, or Territory, and the county in which the land is situated.

Beyond the question of revenue, the advocates of the measure urge the advisability of preventing over-grazing, the leasing system inducing provision for future grazing. The objections raised are the tendency to create a monopoly of grazers dominating the public lands, thus preventing settlers from taking up lands as readily as at the present time.

A report was presented in the House by Mr. Moody, of Oregon, from the Committee on Public Lands recommending the passage of the bill providing for the reservation of certain public lands in the Cascade Mountain Range, in Oregon, as a public park and timber preserve. The proposed park will include Crater Lake, the crater of an extinct volcano a thousand feet deep, with sides so precipitous that approach to the lake can be made only on one side. This is regarded as one of the scenic wonders of the world.

By joint resolution of the Senate and House of Representatives an extra edition of 35,000 copies has been ordered printed of the "Primer of Forestry, Part I.," by Mr. Gifford Pinchot.

The sale of timber on the public lands is the subject-matter of an important bill introduced in the U. S. House of Representatives lately by the Public Lands Committee. The bill is designed to meet the necessity created by a recent decision of the assistant attorney-general for the Department of the Interior, declaring that existing laws do not authorize the sale of timber on public lands.

The bill permits the sale of "so much of the timber growing upon the public lands as may be necessary to supply in a legitimate manner the necessities of those depending upon public timber in settling country, developing and maintaining its resources, industries and public improvements and in providing means of transportation." Penalties are provided for violations of the laws, and "the Secretary of the Interior is authorized to make all proper rules and regulations for carrying the provisions of the act into effect."

This bill by collecting the various statutes, and relieving them of their present ambiguity and uncertainty, will doubtless prove of great benefit to the Western timber states.

The United States Senate has passed the bill introduced by Senator Hansbrough granting to the State of North Dakota 30,000 acres of land to aid in the maintenance of a school of forestry.

The House of Representatives Committee on Public Lands, on March 10th, adopted the following resolution offered by Mr. Mondell, of Wyoming:

"Resolved, That, in order to dispose of legislative suggestions which, at the present time the committee or the Congress is not prepared to act upon, and to facilitate the consideration of other important matters before the committee, all bills having for their object the general cession of the public domain to the states and territories, or the general leasing of the public grazing lands, be disposed of by laying same upon the table."

Representative Lacey introduced in the House of Representatives a bill to set apart certain lands in Arizona, under the title of the Petrified Forest National Park. The bill provides that the park shall be under the exclusive control of the Secretary of the Interior, who shall prescribe such rules and regulations, and establish such service as he may deem necessary for the care and management of the same. Such regulations shall provide specially for the preservation from injury or spoilation of the mineralized or fossilized formations or deposits, natural curiosities, and wonders within the park.

Among other bills introduced in the House recently have been the following relating to forestry and the public lands: A bill to amend Chapter 313, of the United States Statutes at Large, entitled "An Act to Prevent Forest Fires on the Public Domain," providing that any person willfully or maliciously setting on fire any timber, underbrush or grass upon the public domain, or allowing fire to burn unattended near timber or inflammable material, shall be deemed guilty of a misdemeanor. The maximum penalty attached is five thousand dollars fine and two years imprisonment. Failure to totally extinguish a fire started makes the

offender liable to a penalty of one thousand dollars fine, or one year's imprisonment, or both.

A resolution by Mr. Wilson, of Idaho, inquiring of the Secretary of the Interior as to "the number of acres now included within forest reserves belonging to land-grant railroad companies, the amount of forest-reserve scrip issued therefor, the market value of said scrip and the estimated value of the land in lieu of which said scrip was issued, together with a statement showing whether the request for the creation of said forest reserves came from the people residing within the State where said reserves are created or from the land-grant railroad companies who have thus been enabled to exchange land of little value for forest-reserve scrip worth many times the value of the land in lieu of which it is issued."

A bill, by Mr. Lacey, to authorize forest officers to make arrests, "without process in hand, for the violation of the laws or rules and regulations relating to the forest reserves or other forest lands of the United States; and any person so arrested shall be taken for trial before the nearest United States commissioner within whose jurisdiction the reservation or forest land is located." Mr. Lacey also introduced a bill to extend the timber and stone acts to Alaska.

A bill to recover to the United States the title to private holdings within forest reservations and certain national parks by exchange of lands, of area not larger and of value approximately the same. The national parks named are the Sequoia, General Grant, Yosemite, and Mount Rainier. The bill was presented in the Senate by Mr. Perkins.

A bill, by Mr. Wilson, of Idaho, prohibiting the establishment or extension of forest reserves in Idaho except by Act of Congress.

New York.

State Senator Krum has introduced a bill to provide for the appointment of a supervisor of taxes within the State forest preserve. Owing to careless assessments, the towns within the prescribed limits have had charged back upon them thousands of dollars in taxes illegally levied. The remedy proposed is to have such assessments examined, when levied, by a competent attorney, and, in case of error, corrected immediately. The bill was drawn at the suggestion of Comptroller Morgan, who assisted in its preparation.

The special committee appointed by the State Assembly last April to investigate the subject of State forest lands, has sent in a report recommending the increase of the Adirondack Preserve by the purchase of all suitable lands within the limits of that park and also the acquisition of forest lands in other parts of the State near the headwaters of streams.

Michigan.

In order to arouse public interest and determine upon a definite forest policy for the State, the Michigan Forestry Commission has issued a circular asking the aid of public-spirited citizens in the prosecution of its work. The Commission is desirous of securing suggestions from all who are acquainted with the forest conditions and needs of Michigan, in order to formulate a plan to be submitted to the next legislature.

Indiana.

Twenty-eight land-owners in a single county in Indiana have taken advantage of the law passed at the last session of the State Legislature offering inducements toward starting and maintaining private woodlands as a forest reservation, such lands being appraised for taxation at one dollar per acre.

To secure the benefit of the exemption, the forest must contain not less than 170 trees in each acre; a description of the lands must be filed with the County Auditor for record, and examination made by him before appraisal; no horses, cattle, sheep, hogs or goats are to be pastured until the trees are four inches in diameter.

The reservations so far made are for tracts of from three to eighty acres. The benefit of the law cannot be claimed until the trees are three years old, but the ultimate advantage to the land owners has caused the law to be regarded with favor.

THE FORESTER.

A MONTHLY MAGAZINE

DEVOTED TO ARBORICULTURE AND FORESTRY, THE CARE AND USE OF FORESTS AND FOREST TREES, AND RELATED SUBJECTS.

THE OFFICIAL ORGAN OF

The American Forestry Association,

President, Hon. JAMES WILSON,

Secretary of Agriculture.

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JOHN KEIM STAUFFER, EDITOR.

The founding of a school of forestry at Yale University by Mr. and Mrs. James W. Pinchot and the Messrs. Pinchot seems to mark the beginning of a very desirable end—which is nothing more nor less than the establishment of forest schools in connection with every educational institution of importance in the United States. Until very recently the somewhat prevalent idea that forestry was less useful than ornamental detracted from the consideration it rightly deserved. Lately, however, the insistent utterances of those who are in a position to know the actual facts have reached the general public with such success that forestry has taken a long stride forward as a matter for public consideration.

This more general appreciation of forestry is noticeable in many parts of the country. With the announcement of the Yale Forest School comes news of some latent efforts among three colleges in Pennsylvania, each of which wishes to outstrip its competitors in offering courses in forestry; of legislative provision being made for affording the use of government land in California for demonstration purposes and in North Dakota for assistance in establishing a school of forestry—as reviewed in the present and preceding issues of THE FORESTER. The great efforts being made by Dr. Fernow at the New York State College of Forestry; Commissioner Rothrock's work in establishing reserves in Pennsylvania; Chief Warden Andrews' agitation for the Minnesota National Park; and the united efforts of public-spirited citizens in the South for an Appalachian National Park along the Smoky Range in North Carolina—all augur well for a better and more general understanding of what forestry means, and what it seeks to accomplish.

Under such auspicious circumstances an immediate and considerable increase in the membership of The American Forestry Association ought to be insured. On this point THE FORESTER takes pleasure in announcing the election during the past month of two new life members—Hon. Cornelius N. Bliss, former Secretary of the Interior, and Hon. Warren Delano, Jr., of New York City; and also more than one hundred and forty annual members in the last six weeks. Among the latter are Hon. Carl Schurz, President D. C. Gilman, of Johns Hopkins University, Governor Voorhees of New Jersey, Hon. C. C. Beaman, of New York City, and many other prominent men throughout the country.

As The American Forestry Association is not a commercial "business," but an organization of, by, and *for* its members, THE FORESTER feels no hesitancy in asking the assistance of those members in increasing the efficiency and possibilities both of the association and its magazine by drawing to its support many new members. A few words from a member to a personal acquaintance will often carry more weight than all the printed circulars which the Association might send out. There is a blank form of application in every issue. By having this filled in and returned by a prospective new member every reader of THE FORESTER will not only help the cause of forestry; but will just as surely subserve his own best interests—for with increased funds will come new opportunities for making THE FORESTER better in every succeeding month than it was in any month past. THE FORESTER asks your cordial co-operation for the expansion of *your* association and its magazine.

CURRENT COMMENT.

Reforestration in Hawaii.

Reforesting cut-over land or naturally denuded areas is attracting considerable attention all over the Union, but one of the best examples of this class of work is to be seen in the Hawaiian Islands, more particularly on the hills back of Honolulu. The Island Legislature, previous to annexation, appropriated a sum of money for the purpose of trying experiments in reforestation. The latter were most successful, and to-day, when approaching Honolulu, the view embraces the hills, formerly uncovered, now clothed in groves of sturdy trees. This is or should be a strong object lesson to the localities on the Pacific Coast which are in need of forest coverings. It can be, should be and will be done if the general public will only encourage the proper amount of interest and spirit.—*Pacific Coast Wood and Iron.*

College Men and Forestry.

Gifford Pinchot, Forester of the Department of Agriculture, delivered a lecture before the students of Harvard University, in the Fogg Art Museum, Cambridge, on March 2d. The main points of the lecture were those embodied in Mr. Pinchot's lecture at Yale last spring on "Profession of Forestry," as printed in the July FORESTER. The recent advance in forest work and interest was also touched upon forcibly.

Utilizing Forest Reserves.

The effort being made to give to the University of California the care and control of the Lake Tahoe Forest Reserve in that State, is thus commented upon by the New York *Tribune*:

"This will form the nucleus of the new College of Forestry at Berkeley. In the bill which is now before Congress the university is permitted to dispose of timber and water rights and lease pasturage lands, and from these sources sufficient revenue for maintaining a College of Forestry ought to be derived. There is much work for well-trained forestry experts in California, and the planting of timber in stated sections of the Sierras would have marked effect on the rainfall and the amount of water for irrigation."

Restraining Sheep Grazing.

Secretary Hitchcock, of the interior department, recently issued an order canceling 68 permits that were granted sheepmen to graze their flocks in the Mount Rainier forest reserve, and hereafter all sheep will be excluded from that reservation. This is as it should be. If forests are to be preserved, the sheep industry must pass from the hands of a few, who depend on public lands for grazing, to the many small dealers, who depend on their own lands and resources. It is not the sheep industry that is threatened, but merely a change in its management, from a few wealthy men to the middle classes.—Oregon *Native Son.*

For State Instruction.

The Wisconsin State Forestry Association, an organization whose object is to conserve the timber interests of the State, has asked the State University to establish a division of forestry, under the charge of a special professor, where may be trained men competent to care for timber with a degree of knowledge equal to that required for the cultivation of any other crop. The association sets forth the fact that forests are being depleted far more rapidly than they can be replenished by nature, which is a lamentable fact.—*Living Church*, Chicago.

Unanimous Public Opinion.

Referring to the vandalism which would fell the magnificent giants of the Yosemite, the Omaha *World-Herald* says:

"This is exactly what it is—a sacrilege. In no city in the world can be found such architecture as may be seen in the Sequoia groves, and the destruction of a single tree is equivalent to the demolition of the finest temple."

That hits the nail on the head. We have so few things in this country which call for reverence on account of their age that it seems a pity to lessen the number. Those trees came out of the ground when Noah's ark rested on Ararat, or about that time, and they are likely to last, if let alone, until Gabriel sounds his trumpet. The man who would cut one of them down and convert it into cash has no more appreciation of the proprieties than a rhinoceros has of music.—*New York Herald.*

Save the Forests.

The bill introduced into Congress to remove the duty on pulp wood and paper should become a law as soon as it possibly may. Aside from the fact that there is little foreign competition in the manufacture of wood pulp paper, it should be recognized as a necessity for the preservation of our already sadly decreasing forests that the duty be removed. American paper is exported in large quantities to foreign countries and the result of the tariff on the wood pulp of which it is manufactured simply operates to raise the price of paper, while at the same time it is producing the certain destruction of our forests, enormous inroads being made into them each year, in order that the pulp wood may be supplied to the paper factories. It is wellknown that the safety of our water-supply depends upon the preservation of the forests, and could the vast resources of the unexplored Canadian woods be thrown open to our paper manufacturers by the abolition of the tariff on wood pulp, the American forests would be saved from a seriously threatened destruction, while the price of all paper manufactured from the pulp would be correspondingly reduced.—*Times-Union*, Albany, N. Y.

From Different Standpoints.

The æsthetic members of the forestry associations are jubilant. A man in Greenwich, Conn., recently tore down a twenty-five-thousand-dollar-house in order to save some Maple and Elm trees that would have been sacrificed had the structure been moved away bodily; and the Boston *Transcript* rises to remark that "if all citizens were like him the forestry problem could be quickly settled."—*Lumberman's Review.*

Ingenuity in Woodwork.

The most artistic and attractive of all the beautiful specimens of the California exhibit at Paris will be a table top, inlaid with a mosaic of fifty-seven woods, the cabinet work alone having cost $1500. It is a veritable painting, this table top, and the designs are akin to those of the wonderful Persian rugs of the past. No expense or degree of ingenuity has been spared to make the woods of California impress the Paris visitors with the magnitude of this State's forest capabilities.—*Wood and Iron.*

Forest Destruction.

The reckless destruction of our forests is a national scandal and it is full time that measures be taken, not only to preserve what is left, but also to replace much that has been destroyed. The experience of other countries, particularly Germany, has proved that a forest is not like a mine, but rather like a farm. Yet Americans have hitherto treated their forests almost entirely upon the mining basis, assuming that all that could be done was to cut down the trees and then use the land for something else than growing trees.—Denver *Field and Farm.*

Experience as a Teacher.

All in all, it appears that forest culture has taken hold of the people in places where it will do the most good, and that even the lumbermen are taking a great interest in it. There is, therefore, good reason for the hope that forest denudation on a large scale has come to an end here, and that fields which have been swept as by the besom of destruction will by and by be made once more to "blossom as the rose," so to speak.—Brooklyn (N. Y.) *Citizen.*

Checking Forest Denudation.

The increased demand for structural steel in building operations is noted by the New York *World* as being, aside from its industrial significance, a hopeful sign for forest protection.

"It means also, and not less importantly, the salvation of our forests. For not only is wood now largely excluded from the structural parts of buildings, but even as trimming it is rapidly falling into disfavor. Window-frames, window-sashes and even doors and door-casings of steel are now so perfectly made and so cheaply that they are rapidly replacing wood, as wire and tile have replaced lath, and marble and mosaics have taken their ancient place as flooring. With a little further development in this direction we shall be able to check the denudation of forests and protect our rivers from flood on the one hand and drought on the other, and these are the noblest uses of forests."

A Lumber Advocate.

The administration is beginning to take steps for the preservation of some of the big tree groves of California. It is time such a step was taken if we wish our grandchildren to see anything more than the decaying stumps of one of the world's seven wonders.—*Miss. Vall. Lumberman.*

Recent Publications.

Beginnings of Professional Forestry in the Adirondacks: First and Second Annual Reports of the Director of the New York State College of Forestry. Pp. 56.

For the purpose of "placing within reach of a larger number" of people the forest work under his direction, Dr. Fernow has incorporated into a neat pamphlet his first and second annual reports to the New York Legislature, and has prefaced them with an introductory chapter containing much information of interest regarding the aims and objects of his work.

Dr. Fernow says: "By way of accentuating some of the contents of these reports, it appears desirable to preface the same by a discussion of three essential points, which have been merely alluded to in the body of the reports, namely: 1. *That applied forestry is a business for the purpose of producing values for the future rather than the present: 2. That forestry, therefore, and for other reasons, is peculiarly a business for the State, and does not usually recommend itself to private enterprise, except under special conditions: 3. That forestry is based upon the recognition and application of natural and economic principles and laws, which are applicable in all parts of the world alike, with such modifications as the different economic conditions necessitate.*"

Regarding forestry as a business, Dr. Fernow says: "Forestry is not only an art, but a business. The art consists in growing the crop, the business consists in growing the crop most economically and in finding a market for it, where it can be sold with profit: As in all other producing business, the market question is, therefore, the first and foremost one to be settled. For, if the crop cannot be marketed, it is useless to grow it, and we may leave it to nature to provide the forest cover—and finally it must bring a profit, be it large or small, direct or indirect, but a profit, or else the object of forestry is not attained."

On the question of the relation between forestry and lumbering, Dr. Fernow says: "The forester must finally be a lumberman. The difference between the lumberman and the forester is like that between the berry picker in the wild woods and the market gardener who grows his berries with skill. The essential difference between the logger's practice and the forester's practice in utilizing the crop which nature in the virgin woods has grown without regard to man's particular needs, is that the former culls the virgin woods of the valuable portion, without regard to the replacement of the old by the young crop, while the latter's business is to perform his logging so as to secure not only a new crop, but a better crop of the usual species and thus leave his property in better condition for the future."

The portion of the pamphlet devoted to the second annual report comments upon the successful carrying on of the school during the past year, the practical instruction in the forest, the need of more suitable accommodations, the acquisition of the college forest at Axtan, the general policy to be pursued, business considerations involved, organization of administrative forces, the work performed (under seven heads), and expenditures and income. The courses of instruction offered are given in detail at the end of the pamphlet, making a very complete and instructive review of the work being done in New York State.

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